Risk Assessment of the Container Storage Area in the Northern Section of Monsanto Company's John F. Queeny Plant

March 1995

Prepared by
Monsanto Company

Prepared for
Missouri Department of Natural Resources

Executive Summary

The following risk assessment for the RCRA permitted container storage area at Monsanto's John F. Queeny Plant was prepared for Missouri Department of Natural Resources (MDNR) to fulfill requirements for clean closure. The conclusion of the enclosed risk assessment is that chemicals which were detected, or remain, in the storage pad area do not pose immediate or long-term risks to human health. Pathways of exposure which are evaluated in this risk assessment include dermal contact with water present on the pad's surface, ingestion of water present on the pad's surface, and potential exposures via ingestion of groundwater potentially impacted by chemicals present in runoff from the pad's surface. Complete ecological exposure pathways were not identified at the site and, therefore, this risk assessment does not include a quantitative evaluation of ecological risks.

Introduction

On December 21, 1994, MDNR inspected the hazardous waste storage area in the northern portion of Monsanto's John F. Queeny Plant. The storage area was previously used for short-term storage of drummed hazardous wastes. Monsanto is currently seeking clean closure confirmation from MDNR. Following the December inspection, MDNR prepared an inspection report (dated January 11, 1995) which concluded that, based on an initial evaluation of available data, clean closure could not be granted without additional site evaluation. MDNR's report included suggested approaches that Monsanto could follow to achieve clean closure. One of the suggested approaches, if the pad was left in place, was to conduct a risk assessment which evaluated possible environmental hazards. This report utilizes previous sampling data available on the drum storage pad area to evaluate potential human health impacts under the assumption that the storage pad is left in place.

Storage Pad Construction

The container storage area is located in the northern portion of the site. The concrete storage pad is approximately 30 feet by 50 feet and is overlain by a coating of ARMOR-WELD No. 180 floor topping. The floor covering is stained, but intact where areas of staining are observed. Curbs run the entire length of the pad area, and are also coated with ARMOR-WELD. Some separation of the floor coating from the underlying cement has occurred in a small area of the curb in the northern portion of the pad, but the floor coating itself is not compromised. The pad is sloped downwards towards the center of the pad to a catch basin and drain. The sloping grade of the pad was designed to contain any spills to the pad and to direct flow toward the catch basin. The drain is equipped with a shut off valve, which remains in the closed position. The pad is covered by a fiberglass roof and two side walls, also constructed of fiberglass, which provide shielding from the weather and prevent rainfall accumulation.

Appendix A contains a copy of the manufacturer's specification sheet for the ARMOR-WELD No. 180 floor topping. As listed in the spec. sheet, the epoxy floor topping has outstanding adhesion and durability characteristics which prevent the seal from being compromised. Furthermore, the epoxy has good to excellent solvent and chemical resistance characteristics and serves as an excellent chemical barrier to prevent downward seepage of chemical spills. Therefore, sampling of the concrete and underlying soils has not been conducted as a component of previous investigations. The results of previous site investigations in the area of the storage pad are summarized below.

Summary of Previous Investigations

Geraghty & Miller, Inc. conducted two Resource Conservation and Recovery Act (RCRA) Facility Investigations at the Queeny Plant (Phase I and II RFI). Investigations in areas surrounding the drum storage pad focused on investigating possible groundwater contamination due to the historical presence of chemical storage tanks to the south of the drum storage pad. Due to the design and construction of the storage pad and the lack of evidence of spillage in areas surrounding the pad, soil sampling in the area of the drum storage pad was not conducted as part of the RCRA Phase I and II investigations (with the exception of location TW-1B where a sample was taken to measure the fraction organic carbon in the subsurface soil).

Wastes previously stored on the drum storage pad included volatile and semi-volatile organics and metals. Since some areas of staining were observed on the surface of the ARMOR-WELD floor coating, Monsanto decided to perform a final cleaning of the surface of the pad before closure to remove any unbound material from the surface of the pad. October 21 and 22, 1994, the containment area was cleaned by using high pressure cold water supplied by the City of St. Louis Water Division. The entire pad area was washed twice and the rinse water from both washings was analyzed by Savannah Laboratories & Environmental Services, Inc. for a SVOCs, VOCs, and select metals. The results of that analysis and a comparison of detected concentrations to Federal drinking water regulations are presented in Table 1. The Federal regulatory levels for drinking water (MCLs and MCLGs) are not developed for use in analyzing rinse water from any application. However, as was performed by MDNR, a screening level comparison was made in an effort to provide a screening estimate of potential health risks from extended direct contact and/or incidental ingestion of water which might flow over the pad.

The screening level comparison indicated only two compounds were detected at concentrations greater than their allowable concentrations in drinking water. Bis(2-ethylhexyl)phthalate (BEHP) was detected at four times the maximum concentration limit (MCL) in water and mercury was detected at 1.2 times the maximum concentration limit in drinking water. MCLs are based on lifetime consumption of 2 liters of water a day. Therefore, if an individual would consume their lifetime supply of water containing BEHP and mercury at concentrations equal to those in the final rinsate from the pad, only a marginal additional risk of adverse health effects would be noted. However, upon review of the data, the concentration data for BEHP and mercury are both of questionable quality.

While the final rinsate had detectable concentrations of both BEHP (16 $\mu g/l$) and mercury (2.4 $\mu g/l$), analysis of the first rinsate water demonstrated undetectable concentrations of both BEHP and mercury at detection limits of 10 and 0.2 $\mu g/l$, respectively. The detection of BEHP and mercury in the second, but not the first, rinsate indicates the results may reflect analytical variability more than the presence of these compounds on the pad's surface. BEHP is a common laboratory contaminant and was detected in the final rinsate at a concentration only slightly above the detection limit. The detection of BEHP only in the second rinsate, and at a concentration only 1.6x the detection limit, suggests BEHP was a laboratory contaminant. Mercury is a volatile metal and would not be expected to be present on the surface of the pad due to it's physical characteristics. Furthermore, the detection of mercury in the rinse water from the second, but not the first rinse also suggests the detection of mercury was due to laboratory contamination or the result of analytical variability.

Although the detection of mercury and BEHP in the second rinsate are of questionable significance from an analytical viewpoint, the concentrations in the second rinsate did not pass the screening levels established in this assessment, or used by MDNR in their initial evaluation. Even though the first rinsate passed the screening level analysis, the failure of the second rinsate to pass the screening analysis necessitated a more detailed evaluation. Therefore, the following risk assessment of possible exposures was performed.

Risk Assessment for the Former Waste Storage Pad

Dermal contact with surface water

Table 2 presents an analysis of the potential future risks faced by an individual who dermally contacts surface water or rinsate water present on the pad's surface. In estimating a dermally absorbed dose from water, the U.S. EPA has developed equations which are believed to reflect normal human exposure conditions (i.e., of short duration). The U.S. EPA method accounts for the fact that steady state absorption will not occur over the period in which the chemical in water comes into contact with the skin and also accounts for the amount of chemical which remains in the skin after the water evaporates or is removed from the skin surface. However, this method is only applicable to organics, as the method relies on the octanol-water partition coefficient to assess the amount of a chemical which passes through the lipid barrier in the skin. For inorganics, it is generally assumed that less than 1% of the chemical present in water is absorbed through the skin.

The equation, taken from U.S. EPA's 1992 dermal exposure assessment guidance, for estimating the dermally absorbed dose after skin contact with water follows:

$$DA = 2(K_p) \times (C_w/CF) \times (6\ r\ t_{event}/\pi)^{1/2}$$

where:

DA	=	dermally absorbed dose per event (mg/cm^2-event)
K_p	=	permeability coefficient from water (cm/hour)
C_w	=	chemical concentration in water (mg/l)
CF	=	conversion factor (1000 cm^3/l)
r	=	chemical-specific constant (hour)
t_{event}	=	time of exposure event (2 hr)

This exposure scenario was evaluated under the very conservative assumptions that: 1) during each contact event an individual would have 2 hours of dermal contact with water on the pad; 2) chemical concentrations in all future water on the pad would have chemical concentrations equal to those detected in the rinsate washes; 3) potentially exposed portions of their body including the hands, forearms, and lower legs were saturated with water each time the individual visited the pad area; and 4) exposure occurs once a week for the warm months of the year (April through October), for 30 years. The dermal exposure and risk estimates for all organics detected in rinsate water, estimated via this method, are presented in Table 2.

Results of the above analysis of risks resulting from potential dermal exposures indicates the potential for non-cancer health effects are virtually non-existent (i.e., six or more orders of magnitude below those which may result in adverse effects) and that carcinogenic risk from exposure to BEHP in the water is roughly two orders of magnitude below those considered by U.S. EPA to be de minimis (i.e., one-in-a-million or 1×10^{-6}).

For dermal contact with metals the same exposure assumptions as were made for organics were employed in the following analysis. However, for the purposes of this risk assessment, it was considered that the individual would absorb all of the metals in water which came into direct contact with the skin (i.e., a 0.1 cm layer of water covering the exposed surface area: 4050 cm^2 x 0.1 cm = 405 cm^3). This assumption is extremely conservative, as normally less than 1% of a metal in water is assumed to be dermally absorbed. The following equation was used to evaluate dermal exposure to mercury in this assessment.

$$DA = \frac{CW \times CF \times L \times AF \times EF}{BW \times AT}$$

Where:

DA = Dermally absorbed dose
CW = Concentration in water
CF = Conversion factor (0.001 mg/μg)
L = Quantity of water in contact with skin (0.405 l/day)
AF = Absorption fraction (1%)
EF = Exposure Frequency (28 days/yr)
BW = Body Weight (70 kg)
AT = Averaging Time (30 years x 365 days/year)

The average daily dose calculated in this manner for mercury in the second rinsate (2.4 μg/l) equals 1.1×10^{-6} mg/kg-day. The RfD for mercury has been withdrawn from U.S. EPA's IRIS database and is currently under review by the RfD workgroup. However, there is a RfD of 3×10^{-4} mg/kg-day listed in U.S. EPA's HEAST summary tables. The hazard quotient for mercury, calculated using the RfD listed in HEAST, is 3.7×10^{-3}. Therefore, the concentration of mercury in the rinse water is roughly three orders of magnitude below those which would cause any level of health concern.

Ingestion of surface water

If an individual visits the former storage pad when there is ponded water on the pad, and the individual comes into contact with that water, the remote potential exists for accidental ingestion of some of the ponded water. In this risk assessment, it is conservatively estimated that each time an individual comes into contact with ponded water on the pad (same assumptions as listed above for dermal contact) that they ingest a quantity of water equivalent to that which could form a 0.1 cm thick film on the hands surface (i.e., the individual would lick all the water off both hands). The surface area of an adult male's hands, listed in U.S. EPA's Exposure Factors Handbook, is 840 cm^2. The equation used to evaluate this exposure scenario follows.

$$IR = \frac{CW \times CF \times IR \times EF}{BW \times AT}$$

Where:

IR = Ingestion rate (84 ml)
CW = Concentration in water
CF = Conversion factor (0.001 mg/μg)
EF = Exposure Frequency (28 days/yr)
BW = Body Weight (70 kg)
AT = Averaging Time (30 years x 365 days/year)

Calculated doses and risk estimates for this pathway of exposure are provided in Table 3. Results of this analysis demonstrate non-carcinogenic risks under the accidental ingestion exposure scenario are five or more orders of magnitude lower than those which indicate the potential for adverse non-carcinogenic effects. For BEHP, carcinogenic risks are calculated to be four orders of magnitude below those considered de minimis by U.S. EPA (i.e., one-in-a-million or 1.x 10^{-6})

Potential for Groundwater Contamination

In Table 1, a comparison of concentrations of chemicals detected in the wash water was made to Federal drinking water standards. In the analysis of that comparison, it was stated that a comparison of surface water concentrations to drinking water standards was not an appropriate use of the standards. An appropriate analysis evaluates the potential for surface water or subsurface water in the unsaturated zone to impact potential drinking water supplies (i.e., groundwater). U.S. EPA, for generic applications, assumes the minimum amount of dilution which occurs as surface water or subsurface water in the unsaturated zone passes to the groundwater, where a well could be located, is a factor of ten. Therefore, generic application of a Dilution Attenuation Factor (DAF) of 10 to the concentrations of chemicals detected in wash water demonstrates wash water on the pad does not pose any potential risk for contamination of groundwater. Application of the DAF of 10 to detected concentrations of chemicals in the wash water results in all concentrations being below MCLs.

Conclusions

The preceding risk assessment demonstrates that, under a very conservative set of assumptions, chemicals which may remain on the surface of the container storage area pose de minimis risks to human health. The most conservative of the assumptions that were made was that for the next 30 years any water which came into contact with the pad would have concentrations of chemicals equal to the maximum detected concentrations in the wash water. This is highly unlikely, since the detected concentrations were very close to the limit of analytical detection resulting in potentially false positives and the analysis was conducted assuming an infinite source of chemicals on the surface of the pad. Since the pad was designed to prevent overflow of any spills or water which came into contact with the pad and the pad was coated with an impermeable barrier, further analysis and/or sampling in the area of the former container storage area is not warranted.

Table 1
Comparison of Chemical Concentrations in Wash Water from the Storage Pad with Health-based Criteria

	Concentration in Wash Water (ug/L)	PQL (ug/L)	Concentration in St. Louis Water (ug/L)	MCL (ug/l)	MCLG (ug/l)	RfD (mg/kg/d	Slope Factor
First Wash							
Butylbenzylphthalate	33	10	nd	na	100	2.00E-01	
bis(2-Ethylhexyl)phthalate	nd	10	nd	4	0	2.00E-02	1.40E-02
Di-n-butylphthalate	nd	10	nd	na	800	1.00E-01	
Phenol	58	10	nd	na	na	6.00E-01	
Lead	180	5	<5	na	0	na	
Mercury	nd	0.2	<0.2	2	2	3.00E-04	
Second Wash							
Butylbenzylphthalate	13	10	nd	na	100	2.00E-01	
bis(2-Ethylhexyl)phthalate	16	10	nd	4	0	2.00E-02	1.40E-02
Di-n-butylphthalate	16	10	nd	na	800	1.00E-01	
Phenol	32	10	nd	na	na	6.00E-01	
Lead	9.4	5	<5	na	0	na	
Mercury	2.4	0.2	<0.2	2	2	3.00E-04	

Table 2
Risk from Dermal Exposure to Water on the
Former Waste Storage Pad*

	Concentration (mg/l)	Kp (cm/hr)	r (hour)	DA** (mg/cm2-event)	Skin Area (cm2/event)	Exposure (events/yr)	Dose (mg/kg/d)	Hazard*** Quotient	Cancer Risk****
First Wash									
Butylbenzylphthalate	0.033	0.033	21	1.95E-05	4050	28	1.24E-06	6.19E-06	na
Bis(2-ethylhexyl)phthalate	0	0.033	21	0.00E+00	4050	28	0.00E+00	na	na
Di-n-butylphthalate	0	0.033	21	0.00E+00	4050	28	0.00E+00	0.00E+00	na
Phenol	0.058	0.055	0.33	7.16E-06	4050	28	4.54E-07	7.57E-07	na
Second Wash									
Butylbenzylphthalate	0.013	0.033	21	7.69E-06	4050	28	4.87E-07	2.44E-06	na
Bis(2-ethylhexyl)phthalate	0.016	0.033	21	9.46E-06	4050	28	6.00E-07	na	8.4E-09
Di-n-butylphthalate	0.016	0.033	21	9.46E-06	4050	28	6.00E-07	6.00E-06	na
Phenol	0.032	0.055	0.33	3.95E-06	4050	28	2.51E-07	4.18E-07	na

*dose per event calculated according to equation presented in text

**dose calculated by multiplying the dose per event times the skin surface area per event and the number of events per year

***hazard quotient calculated by dividing the estimated daily dose by the reference dose supplied on U.S. EPA's IRIS database

****carcinogenic risk calculated by multiplying the estimated daily dose by the cancer slope factor supplied on U.S. EPA's IRIS database

Table 3
Risk from Oral Exposure to Water on the
Former Waste Storage Pad*

	Water Concentration (mg/l)	Conversion Factor (mg/ug)	Ingestion Rate (l/day)	Exposure Frequency (d/yr)	Expsoure Duration (yr)	Averaging Time (days)	Ingestion Rate (mg/kg-d)	Hazard** Quotient	Cancer Risk***
First Wash									
Butylbenzylphthalate	0.033	0.001	0.84	28	30	10950	3.62E-08	1.81E-07	
Bis(2-ethylhexyl)phthalate	0	0.001	0.84	28	30	10950	0.00E+00	0.00E+00	0
Di-n-butylphthalate	0	0.001	0.84	28	30	10950	0.00E+00	0.00E+00	
Phenol	0.058	0.001	0.84	28	30	10950	6.36E-08	1.06E-07	
Mercury	0	0.001	0.84	28	30	10950	0.00E+00	0.00E+00	
Second Wash									
Butylbenzylphthalate	0.013	0.001	0.84	28	30	10950	1.42E-08	7.12E-08	
Bis(2-ethylhexyl)phthalate	0.016	0.001	0.84	28	30	10950	1.75E-08	8.77E-07	1.05E-10
Di-n-butylphthalate	0.016	0.001	0.84	28	30	10950	1.75E-08	1.75E-07	
Phenol	0.032	0.001	0.84	28	30	10950	3.51E-08	5.84E-08	
Mercury	0.0024	0.001	0.84	28	30	10950	2.63E-09	8.77E-06	

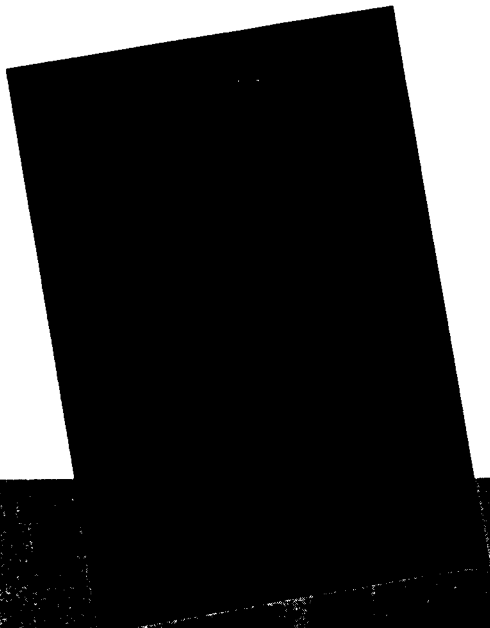
*dose per event calculated according to equation presented in text
**hazard quotient calculated by dividing the estimated daily dose by the reference dose supplied on U.S. EPA's IRIS database
***carcinogenic risk calculated by multiplying the estimated daily dose by the cancer slope factor supplied on U.S. EPA's IRIS database

Appendix A

ARMOR-WELD

No. 180 FLOOR TOPPING

THE FAST - EASY WAY TO PERMANENTLY PATCH OR RESURFACE ALL CONCRETE, WOOD, TILE or METAL FLOORS



- ★ ACID, ALKALI and SOLVENT RESISTANT
- ★ HIGH IMPACT STRENGTH (2 times more than concrete)
- ★ ABRASION RESISTANT (5 times more than concrete)
- ★ HIGH TENSILE STRENGTH (5 times more than concrete)
- ★ NON-SHRINKING
- ★ REMAINS FLEXIBLE
- ★ OUTSTANDING ADHESION
- ★ NON-SPARK (1)
- ★ NON-SLIP (2)
- ★ REQUIRES NO TAMPING
- ★ MAY BE FEATHEREDGED
- ★ EXTERIOR or INTERIOR USE

ARMOR-WELD No. 180 Floor Topping [illegible] cured [illegible] excellent [illegible] of [illegible] including outstanding adhesion and durability. [illegible] ARMOR-WELD [illegible] GREATER [illegible] strength of the concrete.

Normally, when a floor [illegible] resurfaced [illegible] bitumen, 2 to [illegible] inch thicknesses are used. This [illegible] considerable bearing weight to the floor and often necessitates raising equipment and fixtures. [illegible] to 1/4" ARMOR-WELD No. 180 Floor Topping [illegible] eliminates these problems.

ARMOR-WELD No. 180 Floor Topping is a two component [illegible] chemically upon mixing. A third component, a [illegible] particle size aggregate, is then added and the mixture is applied by trowel or screed in much the same way as concrete.

ARMOR-WELD No. 180 Floor Topping is packaged in [illegible] lb., [illegible] lb. and 200 lb. units. Normal colors are [illegible] gray and [illegible] red. Coverage is one square foot per pound at [illegible] depth.

(1) A special carbon filled type available in black only. Packaged in 100 lb. units.

(2) Non-slip qualities vary with type of troweling used in finishing the floor surface.

"MANUFACTURERS OF SUPREME QUALITY COATINGS SINCE 1869"

MISSOURI PAINT & VARNISH CO.

5125 NORTH SECOND STREET ST. LOUIS, MO. 63147

TECHNICAL DATA

RESIN SYSTEM	Unmodified Epoxy.
TYPE	Flexible cured, two component, base and curing agent.
COVERAGE	One (1) Square Foot per lb. at ⅛" thickness.
POT LIFE	2 hours @ 80°F, 10 lb. mass.
CURE TIME	8 hours to foot traffic @ 80°F. 24 hours to vehicular traffic @ 80°F.
SURFACE PREPARATION	Remove all dirt, grease, oil, paint and other foreign matter by chemical or mechanical cleaning. DO NOT USE SOLVENT CLEANING. If chemical cleaners are used, flush area with water and ALLOW TO DRY THOROUGHLY. Use heat lamps or flame drying where necessary to assure a dry surface. On new concrete floors, a 10% muriatic acid wash is recommended. Flush and DRY THOROUGHLY. Remove all loose and broken areas. Cutting or chipping is not required. Where surface is porous and crumbly, prime with a thin brush coat of No. 180 FLOOR TOPPING (mixture without aggregate). Thin this coat with 10% ARMOR-WELD CLEANER. Allow to dry for at least 15 minutes (but not more than 4 hours) before applying the TOPPING mix.
MIXING DIRECTIONS	ARMOR-WELD No. 180 FLOOR TOPPING is packed as a three component unit, one containing the FLOOR TOPPING BASE, the other the CURING RESIN solution, and the third component consisting of the selected aggregate When ready to use, add one (1) part CURING RESIN to four (4) parts FLOOR TOPPING BASE by volume. MIX THOROUGHLY. Then add one volume of this mixture to two volumes of aggregate and mix. It is recommended that this mixing be done in a trough such as a concrete mixing trough, and this mixing should continue until the aggregate is thoroughly blended with the TOPPING. As furnished in standard packages the correct volume of FLOOR TOPPING BASE, CURING RESIN and aggregate is premeasured. Simply add contents of CURING RESIN container to the container of FLOOR TOPPING BASE and mix thoroughy. Then add this mixture to the premeasured aggregate in the container as described above. For small units, mixing of the aggregate can be done directly in the aggregate container.
APPLICATION	Pour mix on surface to be coated and spread with concrete finishing trowel to desired thickness. To aid in spreading and to assure a smooth surface, dip trowel occasionally in ARMOR-WELD CLEANER. Minimum thickness of application is 1/16 inch. No. 180 FLOOR TOPPING may be used for filling deep breaks in concrete floors and may be featheredged. Where the floor surface is smooth and a chemical and skidproof coating is desired, apply a HEAVY brush coat (100 square feet per gallon) of the No. 180 FLOOR TOPPING mixture without any aggregate. Then scatter or broadcast the aggregate over the freshy applied TOPPING and allow to DRY overnight. When dry, sweep off excess aggregate.
COLORS	Concrete Gray & Tile Red (Most other colors available on orders of 600 lbs. or more).
CONTAINER SIZE	10 lb. units, 40 lb. units, 200 lb. units.
ADHESION	4000 PSI plus
IMPACT STRENGTH	12.3 plus ft. lbs.
ABRASION RESISTANCE	.0040 inches per 1500 cycles.
ROCKWELL HARDNESS	M71
SOLVENT RESISTANCE	Alaphatic — Excellent Aromatic — Good Fats & Oil — Good
CHEMICAL RESISTANCE	Alkaline — Excellent Acid — Good Salts — Excellent Soaps — Excellent

This data is based on results obtained in our laboratory and from field reports and is considered reliable. Because of differences in conditions, curing temperatures, and product and concentration variances, this data cannot be considered as an expressed or implied guarantee.

For specific problems, please contact our company or service representative. We will be glad to assist you in selecting the proper coatings and methods of application.

MATERIAL SAFETY DATA SHEET

FOR COATINGS, RESINS AND RELATED MATERIALS

(Approved by U S Department of Labor "Essentially Similar" to Form OSHA-20)

Section I

MANUFACTURER'S NAME Missouri Paint & Varnish Co. DATE OF PREP October 1, 1988

STREET ADDRESS 5125 North Second Street CITY, STATE, AND ZIP CODE St. Louis, MO. 63147

EMERGENCY TELEPHONE NO. (314) 867-8757 PRODUCT CLASS

INFORMATION TELEPHONE NO. (314) 241-6370 Tony Gross

MANUFACTURERS CODE IDENTIFICATION: Polyamide Cured Epoxy Resin

TRADE NAME: Armor-weld No. 180 Floor Topping

Section II—HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	OCCUPATIONAL EXPOSURE LIMITS	VAPOR PRESSURE	TOXICITY DATA
Pigments:				
Tinting Pigments and Talc	22	N.A.		
Catalyst:				
Polymide Resin(Cas#68410-23-1)	14	N.A.	(See Section V)	
2,4,6 TRI (Dimethylaminoethyl) Phenol-DMP30 (Cas#90-72-2)	2	N.A.	(See Section V)	
Vehicle: (Cas#025085-99-B)				
Epoxy Resin, A Reaction of Epichlorohydrin & Bisphenol A	61	200		TLV
Solvents: (Cas#107-98-2)				
Cresyl Glycidyl Ether (less than)	1	200		TLV

Section III—PHYSICAL DATA

BOILING RANGE N.A.

VAPOR DENSITY ☒ HEAVIER, ☐ LIGHTER, THAN AIR

EVAPORATION RATE ☐ FASTER ☒ SLOWER, THAN ETHER

PERCENT VOLATILE BY VOLUME less than 2%

WEIGHT PER GALLON 12 lb/gal Approx

Section IV—FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION OSHA ______ DOT Combustible Liquid

FLASH POINT $307^{\circ}F$ C.O.C. LEL

EXTINGUISHING MEDIA

☐ FOAM ☐ "ALCOHOL" FOAM ☐ CO_2 ☐ DRY CHEMICAL ☐ WATER FOG ☐ OTHER

Goggles-self contained breathing apparatus in close quarters.

UNUSUAL FIRE AND EXPLOSION HAZARDS None-except as above

57441

Section V—HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE

Epoxy Resin and Polyamide is mildly irritating to skin (a skin sensitizer to some people) and moderately irritating to eyes. DMP-30 has oral LP 50 of 1.6g/kg body weight and is SPI Class 5 irritant.

EMERGENCY AND FIRST AID PROCEDURES Eyes-flush with water and get medical attention. Ingestion-not normally a problem. Inhalation-if ill effects occur, remove to fresh air and get medical attention. Skin sensitization-remove worker from use.

Section VI—REACTIVITY DATA

STABILITY ☐ UNSTABLE ☒ STABLE

CONDITIONS TO AVOID Curing resin is unstable in contact with Base or other epoxy resin (curing mechanism)

INCOMPATABILITY (Materials to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

Unknown

Only after base & curing resin are mixed and heated to excess

HAZARDOUS POLYMERIZATION ☒ MAY OCCUR ☐ WILL NOT OCCUR

Section VII—SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove excess-wipe away trace with Xylene or equal

WASTE DISPOSAL METHOD

Collect in metal waste containers and dispose in accordance with local and state regulations

Section VIII—SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION Normally N.A. In confined areas, furnish adequate ventilation or breathing apparatus

VENTILATION

PROTECTIVE GLOVES Hydrocarbon insoluble

EYE PROTECTION Same

OTHER PROTECTIVE EQUIPMENT As above-use good housekeeping-discard contaminated clothing or gloves wash hands before eating or smoking.

Section IX—SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Keep away from fire and excess heat, especially while mixing. Keep containers closed. Practice good housekeeping standards.

OTHER PRECAUTIONS

Some employees are more sensitive to skin dermatitis than others. If an employee shows an allergic skin sensitive reaction, remove him from working with materials.